

CM What is claimed is:

1. A high-efficiency cladding pumping fiber laser apparatus comprising:  
a laser fiber with its core doped with active species,  
at least one laser diode array module,  
an imaging optical system,  
wherein said imaging optical system is disposed between said module and the aperture of said fiber and focuses the beam from said module onto the aperture of said laser fiber, and wherein said laser diode array module comprises at least one laser diode array, a collimating structure, and an optical relay system.
2. An apparatus of claim 1, wherein said laser fiber has a symmetry-broken inner cladding surrounding the core of said laser fiber.
3. An apparatus of claim 1, wherein said laser fiber has a multiple-imaging cladding surrounding the core of said laser fiber.
4. An apparatus of claim 2, wherein said symmetry-broken cladding is symmetry-broken circular cladding.
5. An apparatus of claim 2, wherein said symmetry-broken cladding is a symmetry-broken rectangular cladding.
6. An apparatus of claim 3, wherein said multiple-imaging cladding is rectangular-like multiple-imaging cladding.
7. An apparatus of claim 1, wherein said optical relay system is a cylindrical lens.
8. An apparatus of claim 1, wherein said optical relay system is a 1:1 4f cylindrical relay.

9. An apparatus of claim 1, wherein said optical relay system is a non-1:1 cylindrical telecentric relay.

10. An apparatus of claim 1, wherein said collimating structure includes a plurality of fold prisms.

11. A high-efficiency diode-pumped solid state laser apparatus comprising:  
a laser rod doped with active species,  
at least one laser diode array module,  
an imaging optical system,  
wherein said imaging optical system is disposed between said module and the aperture of said laser rod and focuses the beam from said module onto the aperture of said laser rod, and wherein said laser diode array module comprises at least one laser diode array, a collimating structure, and an optical relay system.

12. An apparatus of claim 12, wherein said optical relay system is a cylindrical lens.

13. An apparatus of claim 12, wherein said optical relay system is a 1:1 4f cylindrical relay.

14. An apparatus of claim 12, wherein said optical relay system is a non-1:1 cylindrical telecentric relay.

15. An apparatus for laser beam transmission comprising:  
an optical fiber for laser beam transmission,  
at least one laser diode array module,  
an imaging optical system,  
wherein said imaging optical system is disposed between said module and the aperture of said fiber and focuses the beam from said module onto the aperture of said optical fiber, and wherein said laser diode array module comprises at least one laser diode array, a collimating structure, and an optical relay system.

